

Honey Bees and Habitat

Marla Spivak, University of Minnesota
www.beelab.umn.edu



Pollinator Habitat Bill

consolidating and enhancing statewide efforts...

- **DNR** Native plant database, prairie conservation and restoration, butterfly surveys, wild bee survey in Itasca State Park
- **MnDOT and DNR** Prairie Passage Route, Roadsides for Wildlife
- **NRCS** Incentive Programs: WHIP, EQIP, WRP and new federal initiative for Upper Midwest
- **BWSR** Reinvest In MN (RIM), wetlands conservation
- **MDA** Pesticide reviews and regulations
- **MN Environmental and Natl. Resources Trust Fund (LCCMR)** many new pollinator projects: MN Zoo, Pheasants Forever, DNR, Univ MN

Pollinator Facts

- 70-80% of all flowering plants rely on animal pollinators (insects and others) to reproduce
- Globally, 35% of crops are dependent on animal pollination (Klein et al. 2007)
- Of all the animal pollinators, **bees** are the most important for crop pollination.

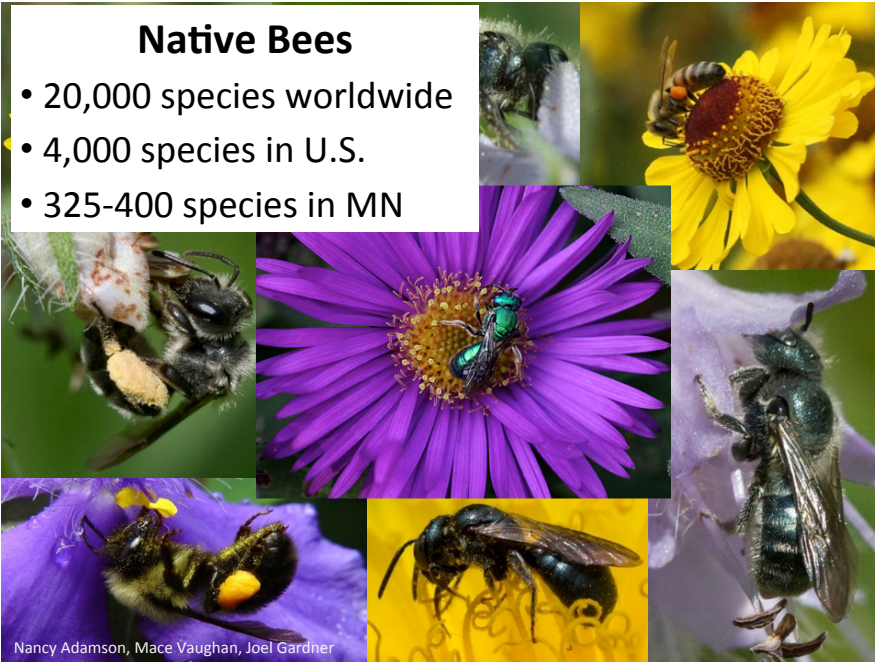
Honey Bee: *Apis mellifera*

introduced from Europe in 1600s



Native Bees

- 20,000 species worldwide
- 4,000 species in U.S.
- 325-400 species in MN



Pollinator Facts

- Of 100 crop species that provide 90% of global food supplies, 71 are bee-pollinated, mainly by wild bees (Klein et al. 2007)
- The value of pollination of food crops in the United States by *honey bees* is estimated at \$15-18 billion, annually, and by *native bees* is estimated at \$3 billion annually.

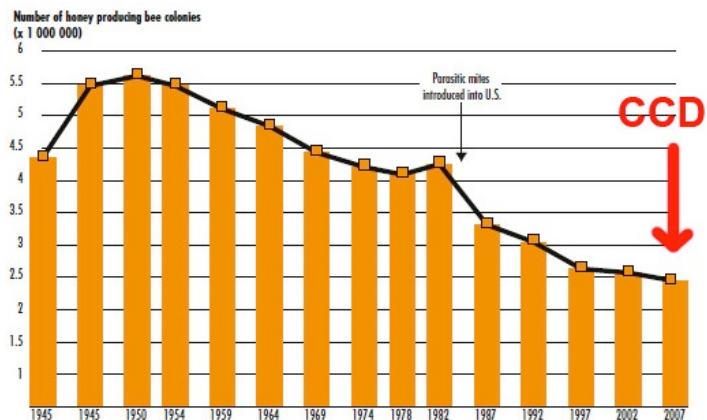
Life with bees....



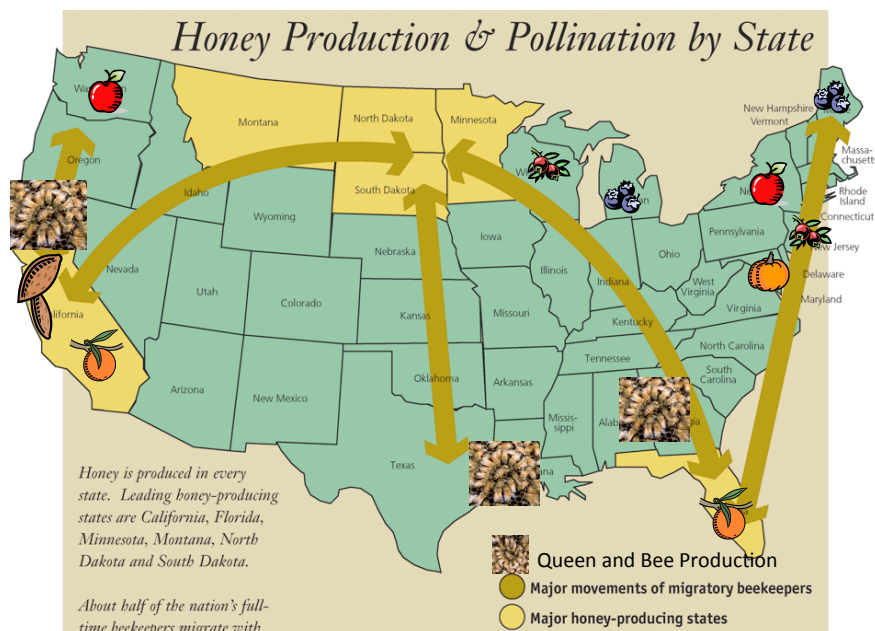
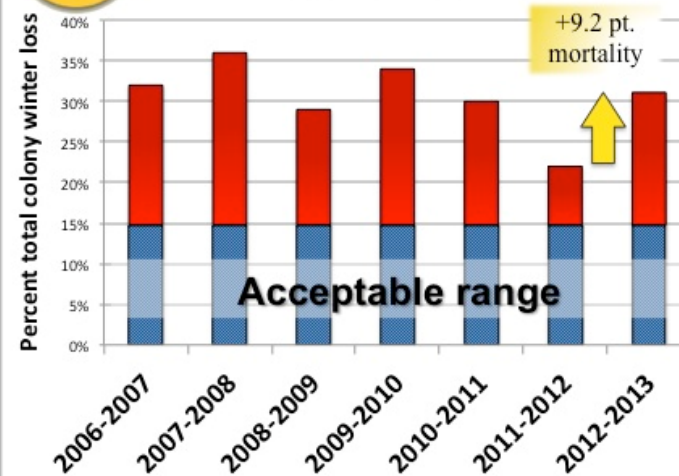
... and without bees



Decline in U.S. honey bee colonies 1945-2007



Managed honey bee colony losses in the US



Honey bees are dying from
multiple and interacting causes

The Interacting P's

- Poor nutrition
- Pathogens and Parasites
- Pesticides

Bee Nutrition

- Pollen - protein
- Nectar – carbs
- Water

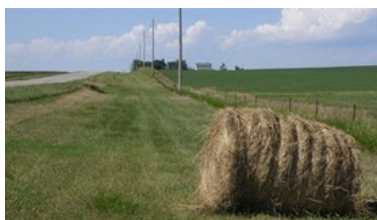
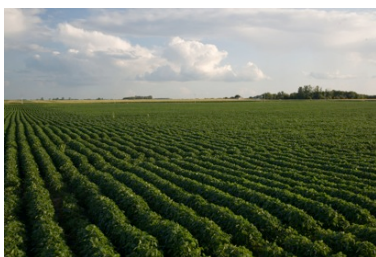
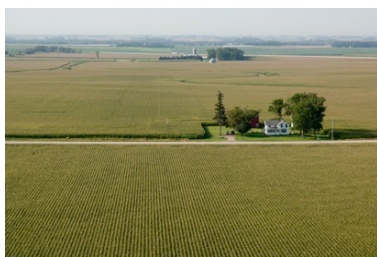


Honey bee nutrition

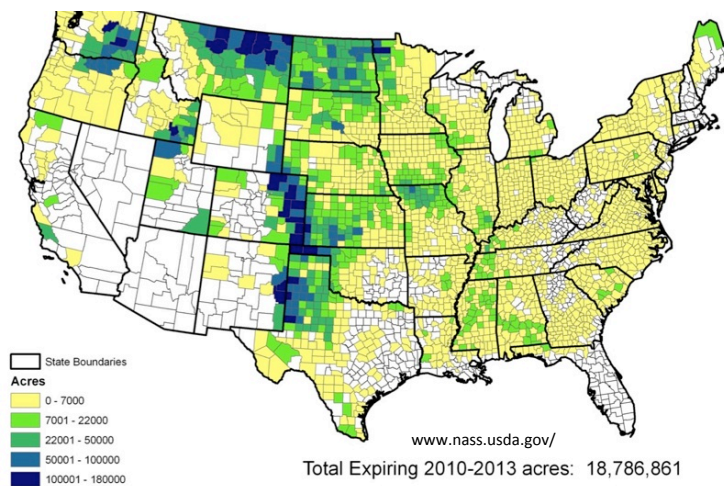
- Visit 2 million flowers to make 1 lb of honey
- Need 75 lbs of honey per colony to survive winter in MN
- Visit 50-100 flowers, usually of the same species, on one foraging trip
- Need 50 lbs of pollen per colony over season
- Need diverse sources of pollen and nectars over growing season for immune system health and survival

Poor nutrition

Lack of nectar and pollen producing flowers



Expiring CRP (2010-2013)



Traditional Honey and Pollen Plants in MN

- Clover (many species)
- Basswood trees
- Alfalfa
- Buckwheat
- Sunflower/ Aster
- “Wildflowers”



Best Honey and Pollen Plant in MN

- *Melilotus* spp. Yellow and White Sweet Clover

Now considered invasive



The Interacting P's

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- [Pathogens and Parasites](#)
- Pesticides

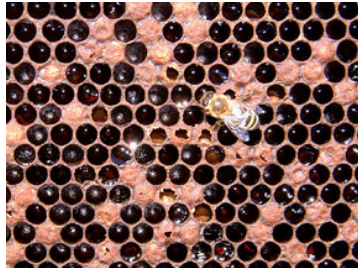
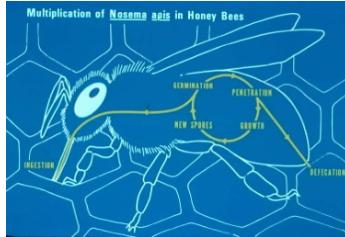
Varroa destructor: mite parasite

Feeds on bee blood, circulates bee **viruses**
among adult bees and brood



Other bee diseases

Nosema gut parasite
Foulbrood
Chalkbrood



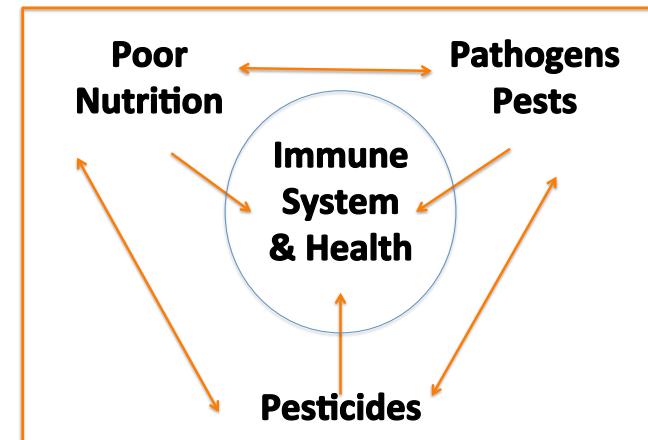
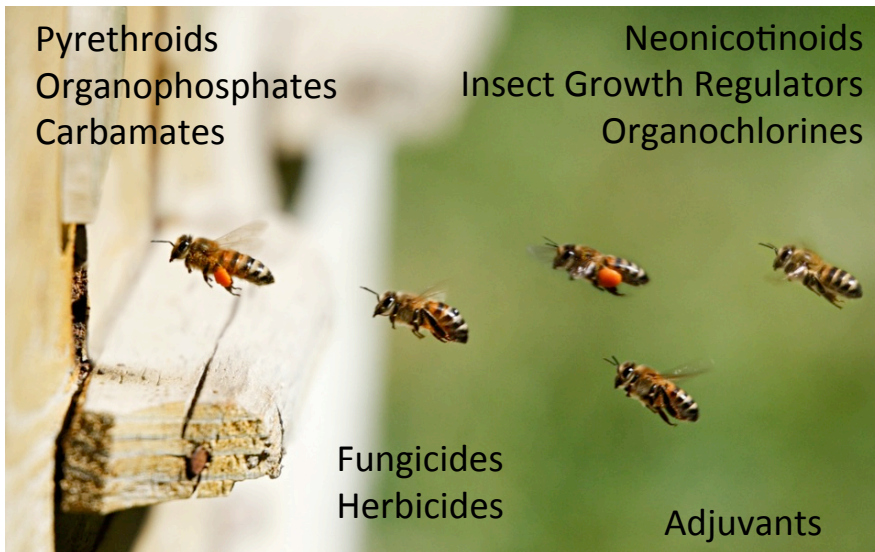
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Six Pesticide Residues in Every Pollen Load

Pyrethroids
Organophosphates
Carbamates

Neonicotinoids
Insect Growth Regulators
Organochlorines



Sublethal doses of pesticides interact with honey bee health in ways we never imagined



Di Prisco G. et al. 2013. **Clothianidin adversely affects insect immunity and promotes replication of viral pathogen in honey bees.** *Proc. Natl. Acad. Sci.* Early access.

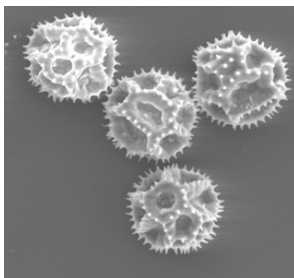
Pesticide adjuvants and tank mixes!



Johnson R, Percel EG. 2013 **Effect of fungicide and spray adjuvant on queen-rearing success in honey bees** (Hymenoptera: Apidae. *J. Econ. Entomol.* 106: 1952-1957. (diflubenzuron IGR)

Pollen diversity and Immune System

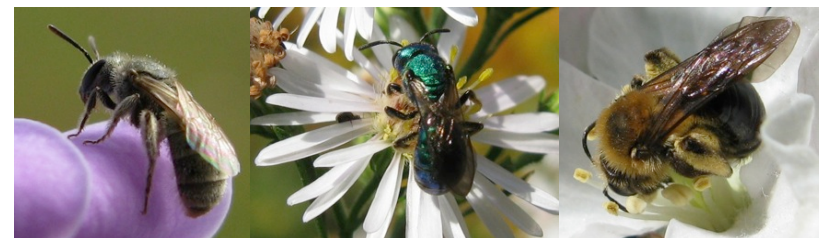
Bees fed single source pollen in diet (dandelion, chestnut, rock rose or oak) had deficient immune system function compared to bees fed diverse pollen sources



Alaux C et al. 2010. Diet effects on honeybee immunocompetence. *Biology Letters*



Plant Bee-Friendly Flowers Avoid Pesticide Contamination



Native Plants: good for honey production?



Cover Crops:

Great for honey production
Native Bees, Oil Seed, Soil Fertility



Elayne Sears, Mother Earth News

Protect Bees from Pesticide Kills

If there are flowers blooming, there will be bees foraging



Reducing pollinator and beneficial insect pesticide exposure

- Choose pesticides with LOW toxicity and LOW residue
- Do not spray on blooming plants while bees are foraging
- Do not allow spray to drift on blooming plants
- Apply in evening or early morning
- Raise awareness about chronic exposure to neonicotinoids

